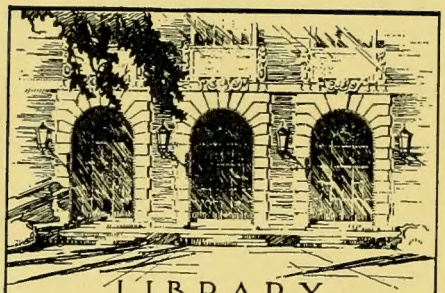

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AUTOMATIC SPRAYER for Control of Biting Flies on Cattle

Willis N. Bruce

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AUTOMATIC SPRAYER
for Control of Biting Flies on Cattle

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Biting flies are important pests of cattle, hogs, and other animals in all the counties of Illinois. By their biting and blood-sucking, they torment the animals and reduce the profits of owners.

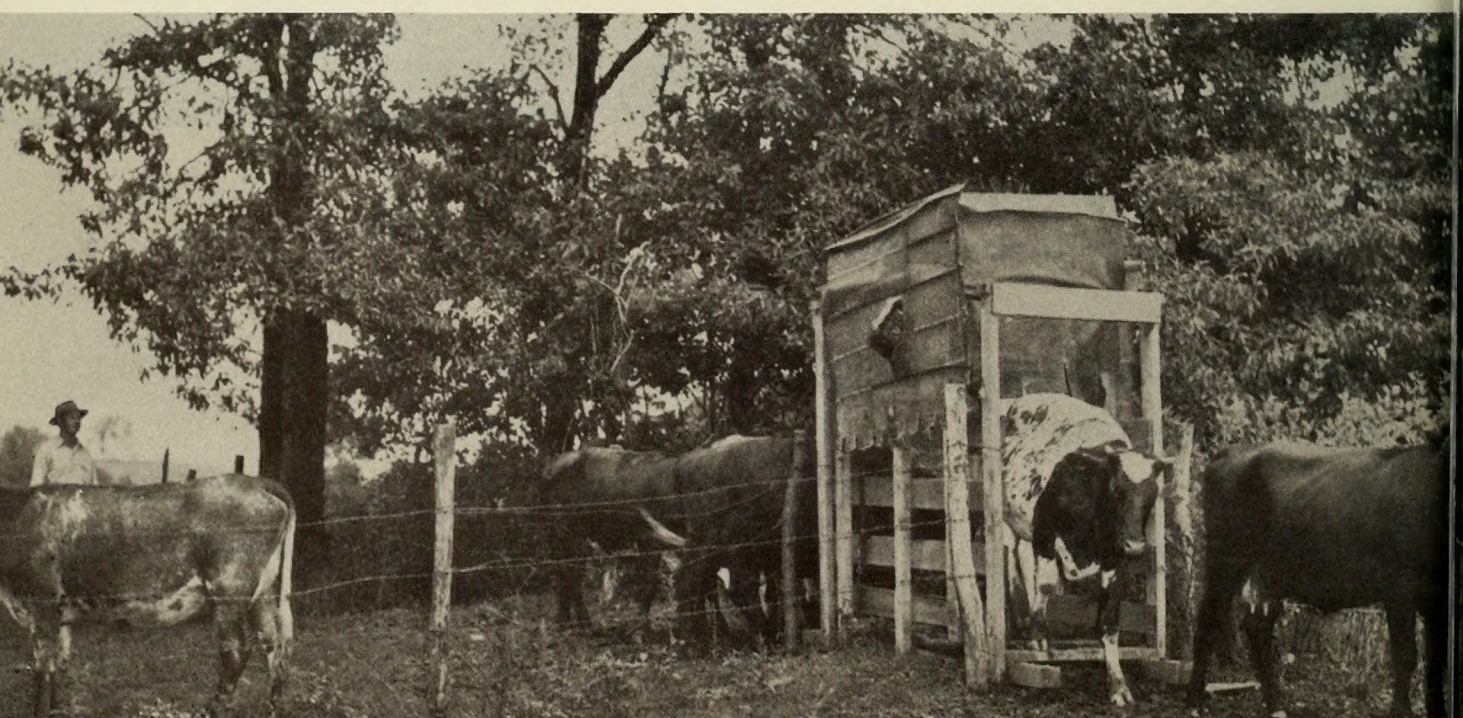
Cattle attacked by biting flies do not graze quietly as they should, but switch, stamp, toss their heads, wrinkle their hides, or wander restlessly about the pasture. The flies rob the animals of blood that should be going to make beef or butterfat. A pint or more of blood a day is not an unusual loss for an animal in some Illinois pastures where horse flies are numerous. Tests in southern Illinois show that heavy feeding by these large biting flies costs cattlemen nearly a pound of beef per animal per day and dairymen 3 or more pounds of butterfat per animal per month.

Some of the biting flies help to spread diseases among domestic animals. Horse flies are said by veterinarians to spread anthrax and anaplasmosis, diseases that in many cases are fatal to cattle.

KINDS OF BITING FLIES IN ILLINOIS

The biting flies that do the most damage to cattle in Illinois are horn flies, stable flies, and horse flies.

Automatic sprayer on farm in Fayette County, summer of 1951. A spray unit installed as part of a chute mounted on skids was placed between two pastures, one improved and the other unimproved. Water was available in both pastures. Salt was placed in the unimproved pasture. Control of flies was excellent.

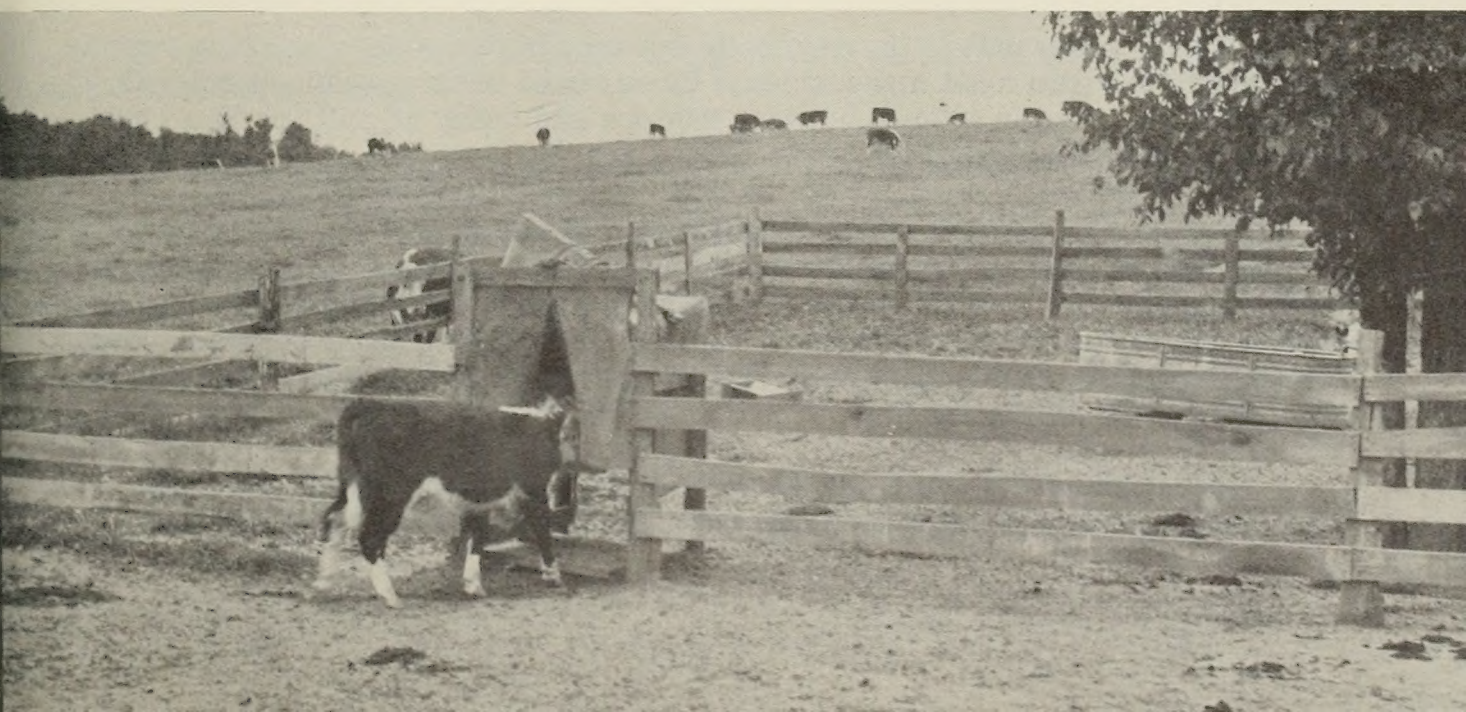


Horn flies (Siphona irritans) are about half the size of common house flies. From April to early October they cluster in great numbers on the backs, shoulders, necks, and underlines of cattle. Because they breed in the fresh droppings of cattle, they are constantly with the animals. They are common in all sections of Illinois.

Stable flies (Stomoxys calcitrans) are about the size of common house flies. Usually much less numerous than horn flies, they are common in Illinois from May to early September or later. They attack chiefly the forelegs, necks, and underlines of cattle. Because of their habit of breeding in spilled feeds, wet hay, and other loose decomposing materials, they usually are not common on cattle that stay away from farm buildings or feedlots.

Horse flies (principally Tabanus sulcifrons, a reddish-brown fly almost an inch long, Tabanus atratus, a larger, black fly, and Tabanus lineola, a striped, brown fly smaller than sulcifrons) are the largest and most vicious of the biting flies in Illinois. They are most common in the southern third of the state, but are found at times in all parts. (In southern Illinois, Tabanus lineola is common from mid-May to late July; Tabanus sulcifrons, which probably does the most damage, is common from early June to early August; Tabanus atratus, much less numerous than the other two species, is found from early July to late August.) Because horse flies customarily lay their eggs on vegetation close to water, they are apt to be numerous in pastures near damp woods, marshes, or streams. The Illinois species attack chiefly the backs and shoulders of cattle. As is general in biting flies, only the females of the horse flies attack animals. The males live on nectar, honeydew, soft fruits, and similar substances.

Automatic sprayer on farm in Johnson County, summer of 1951. Water and salt in pasture were enclosed by board fence, and cattle had to pass through sprayer to reach them. Control of horn flies and horse flies was excellent on this herd. The sprayer used here was similar to that shown on page 6.



WHAT THE AUTOMATIC SPRAYER IS

In the summer of 1950, the writer designed and constructed an automatic sprayer that could apply a concentrated solution of pyrethrins to cattle as they walked over a hinged platform, or treadle, on the way to and from water. Placed in one of the pastures at the University of Illinois Dixon Springs Experiment Station, the sprayer gave excellent control of horse flies.

In a 38-day test, cattle protected from horse flies by the machine gained 20 to 30 pounds per animal more than unprotected animals in comparable pastures. The cost of material was about 1 cent per animal per day.

The original machine was again used in 1951 with good results. In addition, new models, simpler and less bulky, had been built and installed in Dixon Springs pastures. Control of horse flies with the new machine in 1951 averaged 90 to 97 per cent.

The models shown on pages 6 and 7 are slight modifications of machines used in pasture and feedlot in the summer of 1951.

The one-nozzle sprayer gave excellent control of horse flies and horn flies on beef cattle in pasture at Dixon Springs. The two-nozzle sprayer gave equally good control of horn flies, horse flies, and stable flies on a herd of dairy cattle belonging to the University of Illinois at Urbana. In areas where the biting flies present include significant populations of the species that feed principally on the legs and underlines of cattle, the two-nozzle sprayer is recommended.

Although these sprayers have given excellent results under field conditions, they are still in the stage of experimental development, and farmers who build models are urged to use their ingenuity in improving and simplifying the construction.

HOW THE AUTOMATIC SPRAYER WORKS

The working unit of the automatic sprayer is placed in a chute or runway through which cattle must make at least three round trips a week. It may, for instance, be located in a fence between pasture and water or salt, or in a lane between pasture and milk barn.

As an animal steps on the hinged floor, or treadle, of the one-nozzle sprayer, a fine mist comes out through the nozzle and covers the back and one side of the animal. The two-nozzle machine sprays the underlines, also. As the animal makes its return trip through the chute, its other side is sprayed. Even if an animal stops on the treadle and stands there, spray will not continue to run from the nozzle and be wasted.

Although good control results from three round-trip applications per week, better control is obtained from round-trip applications once or twice a

day. The quantity of spray applied per round trip should be increased as the frequency of the trips is reduced. This can be done by increasing the length of stroke of the spray pump or adding another pump.

HOW TO BUILD AN AUTOMATIC SPRAYER

Dimensions for parts of the working units of the one-nozzle and two-nozzle sprayers are given on pages 6 and 7. In the following paragraphs are hints to aid owners of beef cattle or dairy cows in constructing and adjusting these sprayers.

Make bottom frame of five lengths of angle iron either welded or bolted together. Center crosspiece adds stability. Weld upright to middle of one side of bottom frame.

Build treadle of two layers of 1-inch lumber treated with creosote or other wood preservative. Nail the two layers together so that boards cross each other.

Staple coarse hardware cloth or nail cleats to top side of treadle to keep animals from slipping.

Bolt treadle loosely to frame on side opposite upright. Adjust bolts so that unattached side of treadle can be lifted about 3 inches above frame. Hinges may be used instead of bolts.

Use any plunger-type spray pump that will deliver a fine mist of about one-thirtieth ounce of material per stroke. (Used on 1951 experimental sprayers was the Z & W Model 2000 Hydraulic Hand Sprayer, because it was adequate, inexpensive, and the only one of its kind available from local dealers. Manufacturer: Z & W Machine Products, Inc., 5151 St. Clair Avenue, Cleveland, Ohio.)

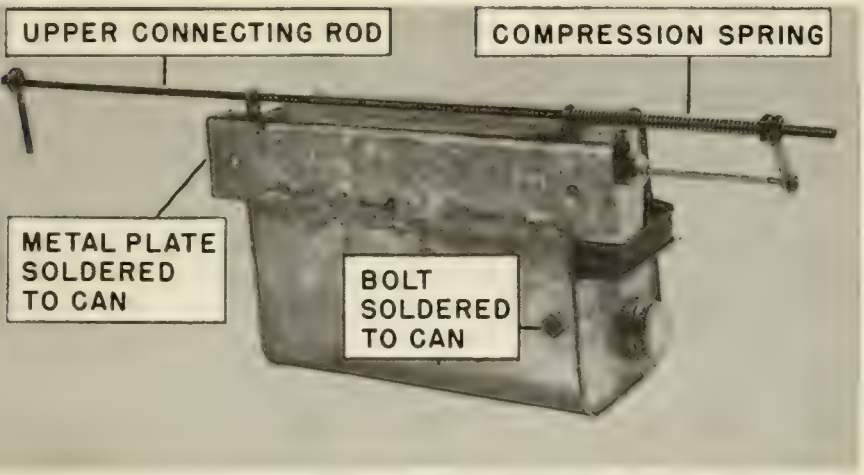
Use any threaded spout that fits pump. Spouts from standard quart or pint cans fit Z & W spray pump. Leave enough tin around spout to make soldering easy. For small herd, quart can may be substituted for gallon can.

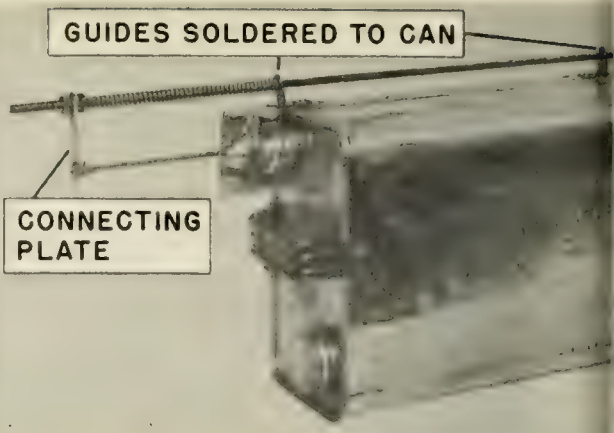
If necessary, add inch or more of tygon (oil-resistant plastic) tubing to lower end of spray pump.

In bolting gallon cans to upright, adjust position of cans to fit size of cattle. In one-nozzle sprayer shown on page 6, and used on beef cattle, nozzle is 55 inches above depressed treadle and tilted at angle of 30 degrees. In two-nozzle sprayer shown on page 7, and used on dairy cows, nozzles are respectively 16 and 47 inches above top of depressed treadle.

Use treadle spring that is strong enough to lift treadle when animal has stepped off.

Insert brake bolt in upright about 7 inches from bottom of upright and about $2\frac{1}{2}$ inches above top edge of lever when treadle is depressed. Position of



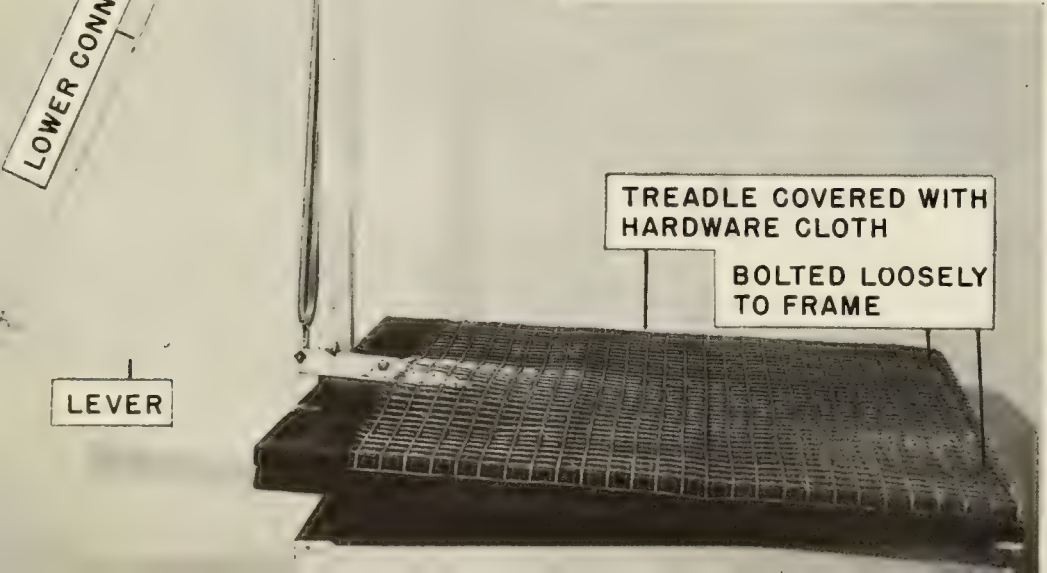


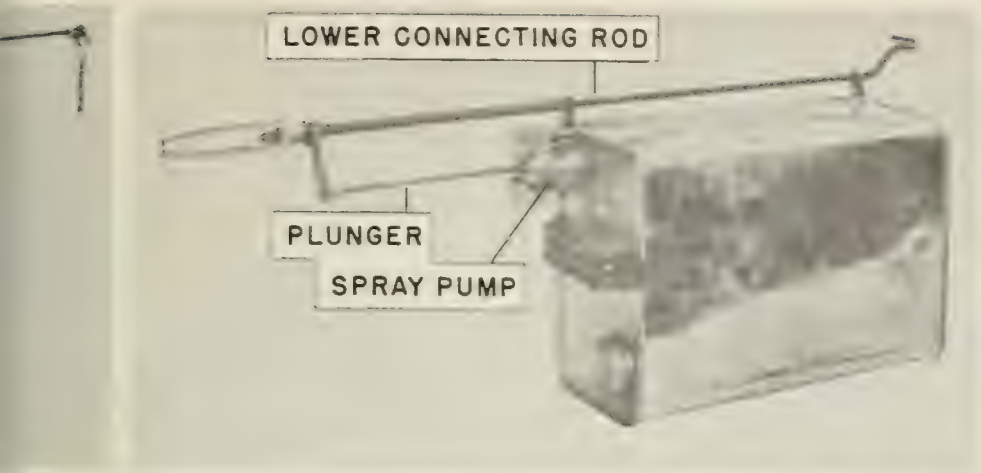
ONE-NOZZLE SPRAYER

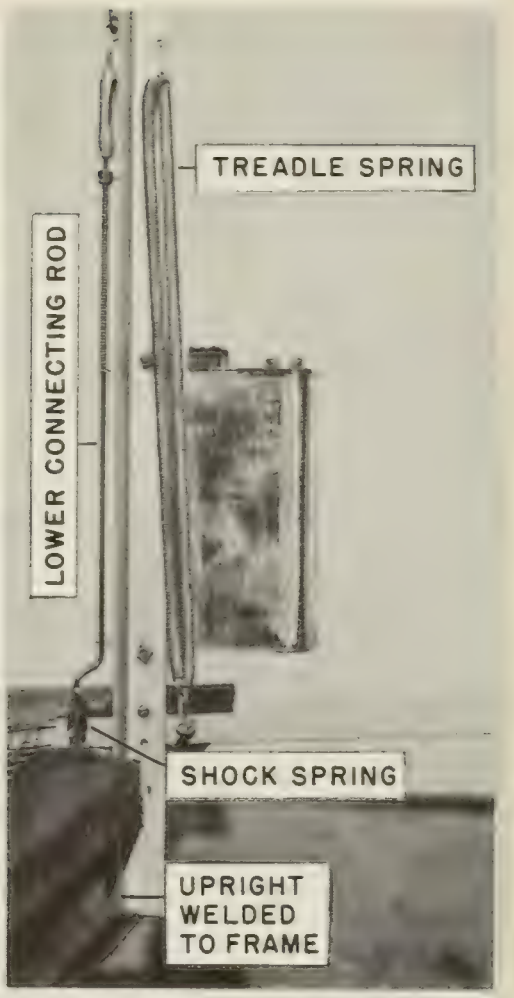
MATERIALS AND APPROXIMATE COSTS

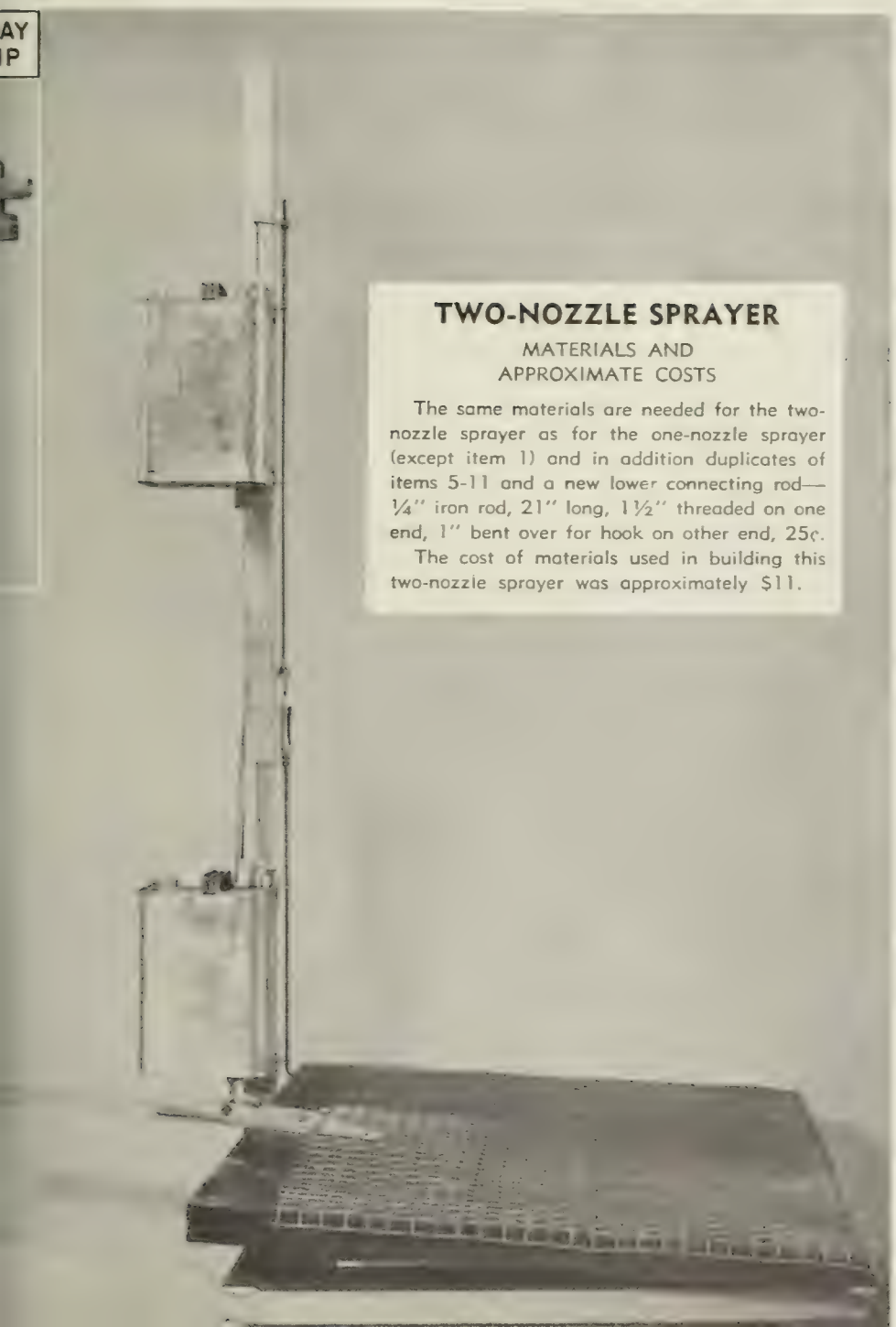
1. Lower Connecting Rod—No. 9 wire, 30" long, 1" bent over for hook on each end. 3¢
2. Shock Spring—Cot spring or 10-gauge extension spring, 2" long. 10¢
3. Turnbuckle—¼" turnbuckle, 5¼" long. 25¢
4. Upper Connecting Rod—¼" iron rod, 26" long, 1½" threaded on one end, 1" bent over for hook on other end. 25¢
5. Connecting Plate—1/16" brass mending plate, ½" x 2". 10¢
6. Guides—2 1/16" brass inside corner braces, ½" x 1½". 10¢
7. Compression Spring—⅜" 14-gauge compression spring, 6" long. 30¢
8. Metal Plate—20-gauge sheet metal, 3" x 12". 10¢
9. Spray Pump—Z & W Model 2000 Hydraulic Hand Sprayer. $1.12
10. Gallon Can—Discarded commerciol spray can.
11. Spout from Quart or Pint Can—with threads to fit spray pump.
12. Treadle Spring—2 No. 6 heavy duty screen-door springs, 20" long. 38¢
13. Lever—1" x 1" x ⅛" angle iron, 24" long. 20¢
14. Hardware Cloth—1" x 1" welded wire mesh, 27" x 36". 70¢
15. Treadle—1" boards, 30" x 36", two layers. $2.18
16. Upright—1½" x 1½" x 3/16" angle iron, 62" long. 90¢
17. Frame—3 1½" x 1½" x 3/16" angle iron, 28" long. $1.26
    2 1½" x 1½" x 3/16" angle iron, 32" long. 96¢
18. Bolts—4 ¼" bolts, 2½" long, two to fasten treadle to frame and two to fasten lever to treadle. 12¢
    2 ¼" bolts, 1½" long, one as brake bolt and the other to fasten treadle spring to lever. 5¢
    2 ¼" bolts, ¾" long, to fasten can to frame. 5¢

The cost of materials used in building this one-nozzle sprayer was approximately $9.







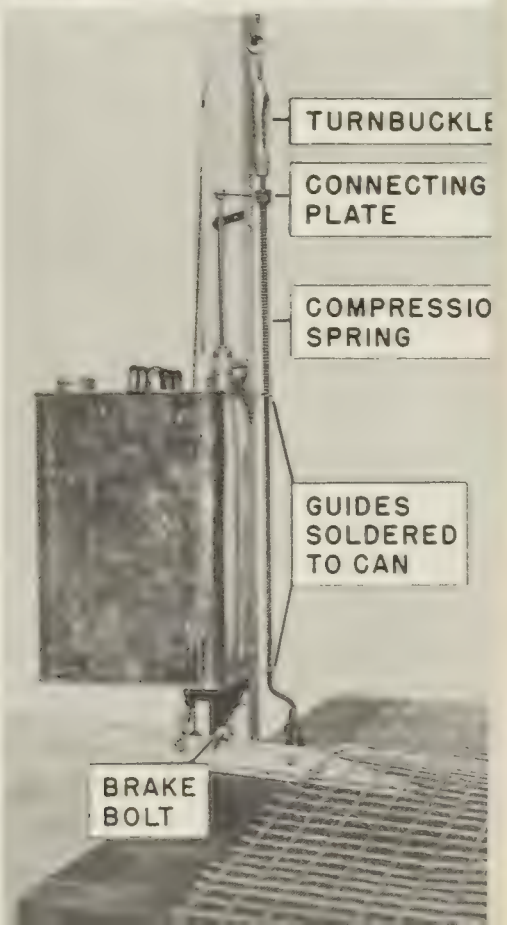


TWO-NOZZLE SPRAYER

MATERIALS AND APPROXIMATE COSTS

The same materials are needed for the two-nozzle sprayer as for the one-nozzle sprayer (except item 1) and in addition duplicates of items 5-11 and a new lower connecting rod—¼" iron rod, 21" long, 1½" threaded on one end, 1" bent over for hook on other end, 25¢.

The cost of materials used in building this two-nozzle sprayer was approximately $11.



brake bolt helps determine length of plunger stroke, which in turn regulates amount of material delivered per stroke. With bolt in position shown on pages 6 and 7, length of stroke in one-nozzle sprayer is about 2 1/4 inches, of two-nozzle sprayer about 1½ inches.

Use compression spring strong enough to lift pump plunger when animal has stepped off treadle.

Use shock spring strong enough to absorb some of jar when animal suddenly steps on treadle.

Adjust connecting rods of two-nozzle sprayer so that weight on treadle pulls plungers of both pumps at same time.

In both one-nozzle and two-nozzle sprayers, take great care to see that sprayer parts are lined up to give straight pull on pump plunger and connecting rods.

The one-nozzle sprayer can be converted to the two-nozzle sprayer or the two-nozzle to the one-nozzle in a few minutes.

INSTALLING AN AUTOMATIC SPRAYER

Pictures on the facing page show a two-nozzle sprayer being installed in the lane of a large dairy farm.

A.--The working unit has been completed and is ready to be placed where cattle will have to step on the treadle when they go between barn and pasture.

B.--A wide piece of scrap lumber has been nailed between two posts of the board fence that forms one side of the lane. Several boards of smaller width would do just as well. Two new posts (black) have been set in the ground about 6 feet apart and about 2½ feet from the lane fence. The ground between these posts and the lane fence has been leveled to give a firm foundation for the sprayer frame. The working unit of the sprayer is then set in place. The upright support with cans and pumps is between the two new posts. The treadle is in the runway between the posts and the lane fence.

C.--Boards (they may be scrap lumber) are nailed to the two new posts to form one side of the runway or chute and to protect delicate parts of the sprayer from the cows. The boards should be so placed that they do not in any way interfere with operation of the sprayer. Nozzles and cans should not project into the runway beyond the boards.

D.--Ends of the boards on the new posts have been sawed off to prevent injury to cows, and a board has been nailed between the top of each new post and the fence opposite to complete the chute. Burlap bags are then nailed to the frame to form a windshield. A windshield of burlap, canvas, or other suit-

D

E

F

able material is necessary to concentrate the fine mist on the cows and prevent its being blown away.

E.--Because the delicate parts of the sprayer must be protected on all sides from the cows, a third new post is set in the ground, and boards are nailed between it and the other two new posts.

F.--A gate placed between the chute and the opposite side of the lane forces the cows to walk through the chute whenever the gate is closed.

Because some cattle may at first show reluctance to walk across a treadle in a burlap-covered frame, the sprayer may be installed by stages, a few days being allowed between stages for cattle to become accustomed to the new objects. For instance, the gate and nearest post can be put in place first. Then the working unit, with the treadle spring disconnected, can be put in place and all framework completed. Finally, the burlap can be tacked on the frame and the treadle spring connected. These steps were not necessary when the experimental sprayers at Dixon Springs were installed. The cattle readily walked through the chutes after being driven through once. The fine spray delivered by the small pump does not frighten cattle.

WHAT TO USE IN THE AUTOMATIC SPRAYER

The material that gave best results in tests with the automatic sprayers is a solution containing 1 per cent pyrethrins and 10 per cent piperonyl butoxide. It is commonly sold under the trade name Pyrenone T-143. It must be used as a concentrate, just as it comes from the can. Dilute emulsions of this and other activated pyrethrins were not effective in tests.

Names of local dealers handling Pyrenone T-143 may be secured from the manufacturer, U. S. Industrial Chemicals, 624 South Michigan Avenue, Chicago 5, Illinois.

Other producers of activated pyrethrins are S. B. Penick & Company, 735 West Division Street, Chicago, Illinois, and McLaughlin-Gormley-King Company, 1715 Fifth Street S. E., Minneapolis 14, Minnesota.

The per-gallon cost of activated pyrethrins seems high to the dairyman accustomed to buying dilute oil sprays, but so little of the pyrethrin concentrate is necessary to give control that the average cost of treating cattle that make two round trips daily through the sprayer is only about 1 cent per animal per day. Activated pyrethrins as used in the automatic sprayer will not injure cattle or contaminate milk.

WHY USE AN AUTOMATIC SPRAYER?

An automatic sprayer in which a concentrated solution of activated pyrethrins is used gives the only practical control now known for horse flies on

beef cattle running in Illinois pastures. Under Illinois conditions, it controls other biting flies, also.

Used with either beef cattle or dairy cattle under a wide variety of conditions, it assures that the animals will be sprayed regularly and at the right times without interfering with other farm work.

At a cost of 1 to 2 cents per animal per day for spray material, it gives an inexpensive, labor-saving method of protecting cattle from pain-inflicting, disease-spreading, biting flies that cut down on production of beef and butterfat.

It is easy to build, install, and maintain at comparatively small cost.

HAND SPRAYING FOR CONTROL OF BITING FLIES

Horn flies on beef cattle can be controlled by DDT or methoxychlor applied at 4-week intervals at the rate of 8 pounds of 50 per cent wettable powder to 100 gallons of water. The thorough spraying, preferably by power equipment, necessary for control requires that the animals be driven into a corral or pen and soaked with about 2 quarts of the spray per animal.

Because of the possibility of contaminating milk, DDT is not recommended for use on dairy cattle or in dairy barns.

Stable fly populations can be effectively reduced by light, daily applications of methoxychlor or activated pyrethrins. Such frequent hand applications are practicable on dairy cattle but not on beef cattle running in pasture.

Horse flies can be controlled on dairy cattle by activated pyrethrins applied by small, hand-operated sprayers at least twice a week. In two summers of tests on dairy cattle in southern Illinois, control with pyrethrins was best and the total amount of material needed was least when light applications (just enough spray to dampen the ends of hairs on the animals) were made twice a day. The concentrate spray gave better results than a dilute emulsion. The first practical, effective, and economical control for horse flies on beef cattle in pasture was obtained in the summer of 1950 with an automatic sprayer in which activated pyrethrin concentrates were used. Horse flies on cattle cannot be controlled by DDT, methoxychlor, chlordane, lindane, or related chemicals.